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# Mathematical Competence and Performance in Geometry of High School Students

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**ABSTRACT**

The primary objective of the study was to determine the mathematical competence and performance in Geometry of high school students. More specifically, the study ascertained if selected variables like gender, third year grade in English, learning styles, class size and classroom structure significantly affect the high school students' performance in Geometry and their mathematical competence in terms of mathematics concepts and problem solving skills. Respondents of the study were the 212 high school students who were taken at random from the three national high schools. The data were analyzed using SPSS Program. Results of the study revealed the following: The classrooms of Geometry classes were "highly structured". The high school students in Mambusao taking Geometry have varied learning styles. They had low level of mathematical competence and low academic performance in the said subject. Students who have high preference in reading/writing and are tactile/kinesthetic learners perform significantly higher. The learning styles of high school students, class size, classroom structure, and level of mathematical competence significantly affect their performance in geometry. While, grade in English, learning styles of the high school students and class size significantly affect their level of mathematical competence.

**Keywords:** *Mathematical Competence, Mathematical Concepts, Problem Skills, Performance*

## 1. INTRODUCTION

High performance in every test in the classroom, in the division, in the region and in the national level administered by the teacher under Department of Education's supervision is one of the major goals of every teacher and every learning institution.

It is a familiar notion that people learn mathematics in different ways. Some people remember best what they have seen. Others are good in words. Some may be competent in solving problems but have difficulty learning mathematics formulae. There are students who are good with their hands or who have creative, artistic talent and flair but who have difficulty with more formal mathematics learning and who do not see themselves as able learners at all [1].

Students usually get low grades in their performance in mathematics due to lack of concept, understanding of the fundamental manipulation or mathematical skills and most of all the love of mathematics, and this may create difficulty and negativism towards the subject. Nevertheless, teachers must look at their profession and try to find out what they can share in the learning process.

According to [2], for teachers to be truly effective they should bring together these four basic components: an appreciation of the discipline of mathematics itself- what it means to "do mathematics", an understanding of how students learn and construct ideas, an ability to design and select task so that students learn mathematics in problem solving environment and the ability to integrate assessment with the teaching process in order to enhance learning and improve daily instruction.

Mathematics concept is an idea or mental impression, the content of which is primarily related to computation, quantitative relationship, systematic reasoning or structure or configuration [3].

Problem-solving on the other hand, is an extremely complex process for students because it involves a complicated rather than simple recall of facts or the application of well- learned procedures. The ability to solve mathematical problems develops slowly over a long period of time because success of adopting so depends in the assimilation of mathematical content knowledge skills. Problem solving skills is one of the most important goals of mathematics education. Thus, the learner should be provided with maximum opportunities to think and imagine that learning abstract concepts that is accepted generally as a difficult subject can be easily grasped and comprehended [4]. According to [5], "one is effective in problem solving if he has acquired knowledge, skills and understanding in meeting various situations". [6] added that one cannot solve mathematical problem if he lacks basic facts, without competence in computation, understanding of mathematical operation, or ability to sequence in logical order
.
It is on the above premise that this study was conducted.

## 2. STATEMENT OF THE PROBLEM

In the past decade, it has been suggested that problem-solving techniques can be made available most effectively through making problem solving, the focus of the mathematics curriculum. Although mathematical problems have traditionally been a part of the mathematics curriculum, it has been only comparatively recently that problem solving has come to be regarded as an important medium for teaching and learning mathematics [7]. With these developments in mathematics instruction, the researcher was motivated to undertake this investigation to ascertain the level of mathematical competence and performance in Geometry of high school students in Mambusao District for 2010-2011. Specifically, the study sought answers to the following questions:

1. What is the classroom structure level of geometry classes?
2. What are the learning styles of the respondents?
3. What is the level of mathematical competence of the respondents in terms of mathematics concepts and problem solving skills?
4. What is the level of performance of the respondents in Geometry?
5. Is mathematical competence related to high school students' performance in Geometry?
6. Is there a significant difference in the performance in geometry when respondents are grouped according to personal related factors such as gender, third year grade in English, learning styles; and classroom profile such as class size and classroom structuring?
7. Is there a significant difference in the mathematical competencies of the respondents when grouped according to student-related factors such as: gender, third year grade in English, learning styles and classroom profile such as class size and classroom structuring?

## 3. LITERATURE REVIEW

### Mathematics Concepts in Geometry

Geometry is a rich source of knowledge, both theoretical and practical, that it should be studied seriously. A working knowledge of simple geometric shapes together with their properties and relationships will contribute to the development of students reasoning and analytical minds [8].

Solving problems in Geometry is a challenge, but it can also be fun when you know how. Understanding the concept and working geometry problems takes practice. The more types of problems that you do, the better you will become in quickly deciding what the problem asks and reaching a solution [9].

Many students learned mathematics as a set of disconnected rules, facts, and procedures. Oftentimes, mathematics teachers find it difficult to recognize the important mathematical principles and relationships underlying the mathematical work of students. Those responsible for the professional development of teachers are increasingly coming to understand the need for long term opportunities for teachers to deepen their understanding of mathematical content [10].

Motivating students to love mathematics is the goal of every mathematics teacher. Teachers consider themselves to be always on the right track, so they expect wonderful outcomes from their teaching. Mathematics can be meaningful by allowing the learners to explore mathematical concepts, relationships and possibly in the most interesting situation where they could gain mastery of skills of valuable meaning and have ready application in one's everyday life [3].

As such, teachers aimed primarily to impart knowledge and make it fully understand for maximum retention of the learner, and in the process, develop his capability to enable him to translate abstract concepts and theories into practical and functional skills. The importance of achieving this latter goal could not be overemphasized. This is so, since these mathematical concepts are essential not only in the furtherance of the learner's academic pursuit, but more importantly in facing his day-to-day life.

To improve students' competence in learning mathematical concept and skills, mathematics should be taught in meaningful manner which are enjoyable and interesting. [4] stated that to motivate students to learn is to give them the most interesting and pleasurable activity. It may follow that students should be provided with the varied activities and exercises to last until students could attain the needed speed and accuracy in mathematical operation. Teachers should bring richness of knowledge and inspiration to their students leading into broader and richer life someday.

In mathematics, concepts form the basis of formulation of generalizations and rules could master the fundamentals of mathematics as early as possible [4].

According to [1], mathematics has been called a symbolic language that enables human to think about record, and communicate ideas concerning the elements and the relationship of quantity.

According [4] to make mathematics an interesting subject, teachers should base their teaching on the principles of child development and learning. Students learn better through exploration and manipulation of object.

Students will value Mathematics if they see how it plays a role in their real lives and in society. Thus, the task of the teacher is to make mathematics learning meaningful to the students by connecting the lesson to the real life experiences and allowing students to experience mathematics through actual measurements and exploration [11]

Lessons in mathematics should be explained more clearly so that students will really understand the concepts that are being taught to them. The use of instructional materials suited to the lessons taken should also be mastered by teachers. Remedial teaching in mathematics should be given to students to give them a better understanding of their lessons. It is in this class that students are encouraged to verbalize the difficulty which they have encountered in learning mathematics. School administrators should try to consider the problems expressed by students so that this will be the bases for the solution to be taken to help students to have a better understanding of Mathematics. It is further recommended that teachers teaching Mathematics should have a major in mathematics. [1]

Teaching- learning process is interesting if a teacher uses teaching aids and devices that would attract and sustain the interest of the students. Techniques, strategies, the use of teaching aids and exposure to interesting physical environment related to mathematics would enhance learning.

According to [20] teachers should find ways and means to find better performance in mathematics by making the lesson more interesting and meaningful and also by giving the students mathematical concept.

## Problem Solving Skills

Problem solving is an important component of mathematics education. It is an essential discipline because of its practical role to the individual and society. Through a problem-solving approach, this aspect of mathematics can be developed. Presenting a problem and developing the skills needed to solve that problem is more motivational than teaching the skills without a context. Such motivation gives problem solving special value as a vehicle for learning new concepts and skills or the reinforcement of skills already acquired [7], [11] Approaching mathematics through problem solving can create a context which simulates real life and therefore justifies the mathematics rather than treating it as an end in itself.

The National Council of Teachers of Mathematics recommended that problem solving be the focus of mathematics teaching because, they say, it encompasses skills and functions which are an important part of everyday life. Furthermore it can help people adapt to changes and unexpected problems in their careers and other aspects of their lives. More recently the Council endorsed this recommendation [11] with the statement that problem solving should underlie all aspects of mathematics teaching in order to give students experience of the power of mathematics in the world around them.

[12] also advocated problem solving as a means of developing mathematical thinking and as a tool for daily living, saying that problem-solving ability lies 'at the heart of mathematics' because it is the means by which mathematics can be applied to a variety of unfamiliar situations. Problem solving is, however, more than a vehicle for teaching and reinforcing mathematical knowledge and helping to meet everyday challenges. It is also a skill which can enhance logical reasoning.
Many writers have emphasized the importance of problem solving as a means of developing the logical thinking aspect of mathematics. 'If education fails to contribute to the development of the intelligence, it is obviously incomplete. Yet, intelligence is essentially the ability to solve problems: everyday problems and personal problems [13].

Training in problem-solving techniques equips people more readily with the ability to adapt to such situations. A further reason why a problem-solving approach is valuable is its aesthetic form. Problem solving allows the student to experience a range of emotions associated with various stages in the solution process. Mathematicians who successfully solve problems say that the experience of having done so contributes to an appreciation for the 'power and beauty of mathematics' [11] the "joy of banging your head against a mathematical wall, and then discovering that there might be ways of either going around or over that wall" [14]

One of the aims of teaching through problem solving is to encourage students to refine and build onto their own processes over a period of time as their experiences allow them to discard some ideas and become aware of further possibilities [15]. As well as developing knowledge, the students are also developing an understanding when it is appropriate to use particular strategies. Through using this approach the emphasis is on making the students more responsible for their own learning. Students can become even more involved in problem solving by formulating and solving their own problems, or by rewriting problems in their own words in order to facilitate understanding. It is of particular importance to note that they are encouraged to discuss the processes which they are undertaking, in order to improve understanding, gain new insights into the problem and communicate their ideas [16].

According to [17], a learner becomes a good problem solver when he can readily understand the important features of the problem. He can sense whether his answer is correct or not. In the teaching-learning process, appropriate strategies and techniques maybe adopted to provide varied activities, namely involvement, analogy, analysis, modified experimental method, direct presentation, teaching by rule, by definition, by rules, by using methods or by using games and simulation.

Computational skills and problem solving performance involve more than thinking; rules, analyze the figures, sizes and angles and how it derives to definite solutions; competence and confidence to apply this knowledge in practical word which surely determine how mathematics is very important. Solving performance of students refers to how an individual digest the problem mentally based on general law such as the relationships between the sides and angles of triangles and with the properties.

According to [4], students have difficulty in problem solving. She further cited that there was no mastery of skills in the fundamental operations although the students have a positive attitude towards mathematics.

The main reason for learning all about math is to become better problem solvers in all aspects of life. Many problems are multi step and require some type of systematic approach.

Most of all, there are a couple of things you need to do when solving problems. Ask yourself exactly what type of information is being asked for. Then determine all the information that is being given to you in the question. When you clearly understand the answers to those two questions, you are then ready to devise your plan.

Learning how to solve problems in mathematics knows what to look for. Math problems often require established procedures and knowing what procedure to apply. To create procedures, you have to be familiar with the problem situation and be able to collect the appropriate information, identify a strategy or strategies and use the strategy appropriately. Problem solving requires practice. When deciding on methods or procedures to use to solve problems, the first thing you will do is look for clues which are one of the most important skills in solving problems in mathematics. If you begin to solve problems by looking for clue words, you will find that these 'words' often indicate an operation.

NCTM recommends teachers enable students to solve problems because problem solving is the heart of mathematics. Students must be exposed to a variety of problems- problems that vary in context. In level of difficulty and in mathematical methods required for their solutions. Students must learn to analyze the conditions in a problem, to restate them, to plan strategies for solving it, to develop several solutions and to work collaboratively with others in search of the solution. Most of all students must develop the discipline and perseverance to solve a problem no matter how complex it is.

## Performance in Geometry

The mathematics performance is on the average and they encountered moderate difficulty in the subject with both algebra and geometry as highly difficult subjects [18].

Likewise [19], found out that the performance of the college freshmen students of Polytechnic College of Antique for the Second Semester of 2001-2002 in arithmetic computation and problem solving skills was satisfactory.

In the study of [20], revealed that the performance of Grade V pupils in Mathematics of Tapaz East District for SY 1997-1998 was satisfactory. She recommended that teachers should find ways and means to help their pupils get better grades in Math by making the lesson more interesting and meaningful and by giving the pupils mathematical exercises so that they will master the mathematical concept.

[4] found that the performance in problem solving in mathematics of Grade IV pupils in the District of Ivisan, Capiz, was unsatisfactory.

## Factors Affecting the Mathematical Competence and Performance in Geometry

### Gender

Several studies have been conducted relating gender to performance of students in mathematics.

A study conducted by [1] concluded that there was no significant difference in the academic performance of first year high school students categorized as males and females which implies that gender does not have a direct bearing on students' academic performance in mathematics.

This finding is further supported by [21] that there were no gender differences in mathematics learning from kindergarten to third grade. Differences in gender began to emerge in the $4^{th}$ grade but they were not significant. Girls were slightly superior with boys in computation while boys were found slightly superior to girls in mathematical reasoning.

However, [3] claimed that gender was related to academic achievement and indicated that females performed better than males. Also, a study conducted by found that females performed better in mathematics [3].

[22] in his study found that female respondents are better performers in Algebra than the males.

[19] found that female students performed better than males in arithmetic computation and problem solving skills.

In the study of [18] results showed that females perform significantly better than males. The study further revealed that there was a positive significant correlation between gender and academic achievement and mathematical performance.

## Learning Styles

Everyone has a learning style. One's style of learning, if accommodated, can result in improved attitude toward learning and increased productivity, academic achievement, and creativity. Learning style is a composite of characteristics, cognitive, affective and physiological factors that serves as relatively stable indicators of how a learner perceives, interacts with and responds to the learning environment. Some may prefer to learn by listening to someone talking about the information. Others prefer to read the concept in order to learn it, while some need to see a demonstration of the concept. Learning style theory proposes that different people learn in different ways and that it is good to know what one's own preferred learning style is. Knowing one's learning style improved self-esteem. When children understand how they learn and how they struggle to learn, they can be more in control of their environment and can ask for what they need [23].

Knowing one's learning style preferences can help plan for activities that take advantage of the student's natural skills and inclinations. There are many different learning styles. Identifying preferred learning style leads to meta-cognition (self-awareness). A preferred learning style is like your favorite shoes. But favorite shoes are not always appropriate, so you have to try something different. There is no right or wrong learning style. Although one may prefer one style over another, preferences develop like muscles, the more they are used, the stronger they become. To gain a better understanding of one as a learner you need to evaluate the way you prefer to learn or your learning style. Students can learn any subject matter when they are taught with methods and approaches responsive to their learning style strengths [25].

The learning style of the students is based on the theory of constructivism. This theory elaborates that the learner chooses and finds the type of learning suitable to his experiences [25]. This statement was corroborated suitably to his experiences and learning style.

The concepts learning style is based on the theory that an individual responds to educational experiences with consistent behavior and performance patterns. The complexity of the construct psychometric problems is related to its measurement and the enigmatic relationship between culture, the teaching and learning process [25].

In the study conducted by [1] she found out that there was no significant relationship between learning style and academic performance of first year high school students in Lapaz National High School. This result was contrary to the finding revealed in the study of [1] that a highly significant relationship was established between the students' learning styles and academic performance.

## Class Size

Class size as a possible factor in pupil and teacher efficiency was mentioned by writers of textbooks in educational administration, in school surveys, and in the reports of school superintendents and committees, before any controlled studies were made. These writers frequently set up empirical standards of class size, basing them upon experienced and opinions. The following statements have been chosen as typical of the sources mentioned. "In order that the very best work may done, class in the school ought not to contain more than from 35 to 40 pupils. When classes are of this size, it is possible for the teacher to give the time and attention requisite to the achievement of the best results. "All school administrators agreed that 40 is the super-maximum number of pupils that should under any circumstances be seated in any elementary schools [24].

## Classroom Structure

A significant issue in education reform today is the effect of classroom structure on the cognitive development of students.

The management of a classroom includes control of its physical conditions, proper utilization of materials for instruction, classroom routine and discipline.

The physical aspects includes the location, size, shapes, lighting, ventilation, acoustic and provisions for sanitation. While the location and the size of the room are not within the teacher's control, the ingenious and creative teacher can transform even the dullest room in the building to be attractive, restful and comfortable. The educational climate of the room should be conducive to learning.

Other aspects related to classroom management are:

Lighting. Lighting and illumination of the room should be adequate. Good lighting facilities affect the health and the learning of the pupils/students. There are several factors that should be considered into the provision of good lighting facilities. These are the size of the room, the light available, the location of the doors and windows, the colors of the walls, shades and manipulation of blinds.

The general physical appearance of the room can stimulate pleasant feelings, attitudes, thoughts, ideas, and appreciations that are essential to learning. The climate can enhance the morale of the learners, and, in effect, work hard and learning becomes more meaningful [26].

Classroom structure is made of the activities and physical composition of school-based learning environment. Classroom structure can be ordered in ways that influence or manipulate student behavior; teachers routinely learn these different ways in order to address everyday student behavior and learning, as well as to address special needs and more specialized learning as students grow older.

"A classroom that is well structured can result in increased learning opportunities, and can increase opportunities for appropriate social interactions. A well-structured classroom can also decrease frustration, which may result in fewer challenging behaviors. For a staff, it can increase efficiency in that staff members can spend less time dealing with challenging behavior and more time working on increasing desired skills... A well-structured classroom should be a positive, pleasant place where students and staff alike want to be."

According to [27] one of the factors that affect the efficiency of learning is the condition in which learning takes place. He noted that the physical conditions needed for learning is under environmental factors. This includes the classroom, textbooks, and equipment. In school and at home, the condition for learning must be favorable to produce desired results. It is difficult to do a good job of teaching in a good type of building and without adequate equipment and instructional materials. According to the same author, instructional materials are not instructional in themselves. In reality, they are only aids to instruction. They are used to gain knowledge, concepts, ideas, and deals through the senses of hearing, seeing and touching. The use of different senses will also add effectiveness in causing learning to be meaningful and functional.

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# 4. METHODOLOGY

The descriptive correlational design was used in this study. According to Best, in [4],descriptive research deals with describing, recording, analyzing, and interpreting conditions that exist. It involves some types of comparison or contrast and attempts to discover relationships between existing non-manipulated variables. Good and Scates in [4] added that descriptive research is of large value in proving facts on which professional judgment maybe based.

On the other hand, correlational research method seeks to investigate whether a relationship exists between two or more variables. It enables the researcher to make more intelligent predictions [11].

# 5. RESULTS AND DISCUSSION

**Personal and School Related Characteristics of the Respondents**

Data in Table 2.0 reveals that more than a half of the respondents were female (55.7%) and less than a half of them were male (44.3%). This suggests that the females had exceeded the distribution of the males in the study.

Shown in the same table are the third year grades in English of the student-respondents. It appeared that more than two-fifth of them had very low grade in English (44.3%). This was closely followed by around four tenth (40.1%) with low grade; a little less than one fifth (14.6%) were with average English grade and two (0.9%) had high grade in English. The English mean grade of 80.90 showed that students had low grade in English which implies that most of these respondents do not possess adequate linguistic skills to assist them in grasping easily the mathematical concepts lessons in Geometry.

As to class size, data show that majority of them attended big class (69.3%); more than a fourth belonged to average class (26.9%); and a smaller percentage of students were assigned to a small class (3.8%) This result implies that the geometry class attended to by the respondents was quite big in number, hence might be overcrowded during the class session.

**Table 2. Distribution of respondents according to their personal and school related characteristics**

| VARIABLE | FREQUENCY | PERCENT |
|---|---|---|
| Gender | | |
| Male | 94 | 44.3 |
| Female | 118 | 55.7 |
| TOTAL | 212 | 100 |
| Third Year Grade in English | | |
| Very Low | 94 | 44.3 |
| Low | 85 | 40.1 |
| Average | 31 | 14.6 |
| High | 2 | 0.9 |
| TOTAL | 212 | 100 |
| MEAN = 80.90 (Low) | | |
| Class Size | | |
| Small | 8 | 3.8 |
| Average | 57 | 26.9 |
| Big | 147 | 69.3 |
| TOTAL | 212 | 100 |

## Level of Classroom Structure

Data in Table 3.0 revealed that a little more than three fifth of the respondents (61.8%) claimed that their classrooms were highly structured; more than a fifth (22.2%) said that they were "uncertain" while more than a tenth (15.6%) had very highly structured room and one (0.5%) said the classroom was poorly structured.

The mean of 3.71 showed that the Geometry classrooms of the respondents' were "highly structured". This suggests that Geometry classrooms are ideally designed for quality instructional outcomes.

**Table 3. Distribution of respondents according to their classroom structure.**

| CATEGORY | FREQUENCY | PERCENT |
|---|---|---|
| Poorly Structured | 1 | 0.5 |
| Uncertain | 47 | 22.2 |
| Highly Structured | 131 | 61.8 |
| Very Highly Structured | 33 | 15.6 |
| TOTAL | 212 | 100 |
| MEAN = 3.71 (Highly Structured) | | |

## Learning Styles

The mean scores on the learning styles of the respondents are presented in Table 4.0. The same highest mean scores (M=3.60) appeared to be on those where respondents highly preferred reading and writing and tactile learning styles, respectively. This was closely followed by the visual learning style (M=3.53), and the last was the auditory learning style with a mean of 3.43. All mean scores however, were verbally interpreted "high" in all composite of learning styles. This indicates that student respondents were highly visual, auditory and tactile learners and had high preference for reading and writing style. This implies that

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students employed varied learning styles according to the learning activities they are into during their geometry class. This is likely to say that respondents learn in different ways.

**Table 4. Learning styles of the respondents**

| LEARNING STYLES | MEAN | VERBAL INTERPRETATION |
|---|---|---|
| Visual | 3.53 | Highly Visual |
| Auditory | 3.43 | Highly Auditory |
| Reading/Writing Preference | 3.60 | High Preference |
| Tactile/Kinesthetic | 3.60 | Highly Kinesthetic |

## Mathematical Competence Level

Table 5.0 reflects the mathematical competence level of the respondents in terms of mathematical concepts and problem solving skills. As revealed, the level of competence in mathematical concepts of the students seemed "low" as this registered a mean percentage score of 36.95. As to their level of competence in problem solving skills, respondents were also found "low" as revealed by the mean percentage of 34.20 for this component. The over-all mathematical competence of the respondents was generally low, (M=35.75%) implying that students were not proficient in geometry.

**Table 5. Mathematical competence of the respondents**

| COMPETENCE | MEAN | V.I |
|---|---|---|
| Mathematical Concepts | 36.95 | Low |
| Problem Solving Skills | 34.20 | Low |
| GRAND MEAN: | 35.75 | Low |

### Mathematical Concept Competence Level

The distribution of the respondents as to their level of competence in mathematics concepts is shown in Table 5a. Results reflected a low mathematical concept level for a little less than two-third of the student respondents (63.2%). The same numbers and percentages of respondents (18.4%) were with very low and average levels of mathematical concepts, respectively. The mean percentage of 36.95 indicated a "low" level in mathematical concepts among student respondents. This implies that mathematical concepts in geometry lesson seemed difficult for the students to grasp.

**Table 5a. Distribution of respondents as to their level of competence in mathematical concepts**

| COMPETENCE | FREQUENCY | PERCENT |
|---|---|---|
| Mathematical Concepts | | |
| Very Low | 39 | 18.40 |
| Low | 134 | 63.20 |
| Average | 39 | 18.40 |
| TOTAL | 212 | 100.00 |
| MEAN = 36. 95% (Low) | | |

## Level of Problem Solving Skills

The distribution of the respondents as to their problem solving skills (Table 5b) showed that less than three-fourth of them (70.3%) had low problem solving skills. Only one (0.5%) was found with high problem solving skills, while those in lesser percentages were found to have very low (17%) and average (12.3%) problem solving skills respectively. The mean percentage of 34.20 suggests a low level problem solving skills among student respondents implying that most of them were not fully armed with knowledge as revealed by their low mathematical concepts level. Thus, it follows that these respondents might not have acquired enough logical reasoning skills to create a context simulating real life.

**Table 5b. Distribution of respondents as to their level of mathematical competence in problem solving skills.**

| COMPETENCE | FREQUENCY | PERCENT |
|---|---|---|
| Problem Solving Skills | | |
| Very Low | 36 | 17 |
| Low | 149 | 70.3 |
| Average | 26 | 12.3 |
| High | 1 | 0.5 |
| TOTAL | 212 | 100 |
| MEAN = 34. 20% (Low) | | |

## Performance Level in Geometry

Performance in geometry (Table 6.0) appeared to be very low among more than two-fifth of the respondents (45.3%); while more than a third (35.4%) were found with low level performance; less than a fifth (17%) were average performers and only 2.4 percent had "high" performance. The mean of 80.76 indicates a low level performance in geometry subject by the student-respondents.

This result conformed with the findings of [4] that performance in Mathematics of Grade IV pupils was unsatisfactory. However, the result contradicted [19] study who found out that college freshmen of PCA performed satisfactorily in arithmetic computation and problem solving skills.

**Table 6. Respondents' level of performance in geometry**

| PERFORMANCE | FREQUENCY | PERCENT |
|---|---|---|
| Very Low | 96 | 45.3 |
| Low | 75 | 35.4 |
| Average | 36 | 17.0 |
| High | 5 | 2.4 |
| TOTAL | 212 | 100.0 |
| MEAN = 80.76 (Low) | | |

## Relationship between Mathematical Competence and Performance in Geometry

**Mathematical Concept Competence and Performance in Geometry**.

The results of the analysis using Pearson Product Moment Correlation (r) indicate that mathematics concept competence is highly correlated to performance in geometry. ($r= 0.463$; $p < 0.05$), therefore, the null hypothesis which states that these two variables are not related is rejected.

The result seems to suggest that performance in geometry is highly affected by the competence of the high school students in mathematical concept. It seems to suggest that the higher the mathematical competence, the higher is the performance in geometry.

**Table 7. Correlation matrix on the relationship between Performance in geometry and mathematical concept competence.**

| VARIABLE | PERFORMANCE IN GEOMETRY | | COMPETENCE | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.463 ** | 0.000 |
| COMPETENCE | 0.463** | 0.000 | 1.0 | 0.000 |

** Highly significant

**Mathematical Skill Competence and Performance in Geometry**.

Shown in Table 7a is the relationship between mathematics skill competence of the respondents and their performance in Geometry. The r value ($r= 0.405$; $p < 0.05$) reveals a highly significant relationship between the two variables, therefore, the null hypothesis which states that these variables are not related is rejected.

The result seems to indicate that the more competent the student in problem solving skills, the higher is his/her grade in geometry.

**Table 7a. Correlation matrix on the relationship between performance in geometry and mathematical skill competence**

| VARIABLE | PERFORMANCE IN GEOMETRY | | COMPETENCE | |
|---|---|---|---|---|
| | r | r prob. | r | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.405** | 0.000 |
| COMPETENCE | 0.405** | 0.000 | 1.0 | 0.000 |

** Highly significant

## Mathematical Competence (taken as a whole) and Performance in Geometry

Presented in Table 7b is the results of the analysis of the relationship between mathematics competence of the respondents when taken as a group and their performance in geometry. The r value ($r=0.518$; $p < 0.05$) clearly shows a highly significant relationship between the two variables, therefore, the null hypothesis which states that mathematics competence is not related to performance in geometry is rejected.

The findings seem to suggest that the higher the mathematics competence of the students in concepts and skill, the higher is their grades in geometry.

**Table 7b. Correlation matrix on the relationship between performance in geometry and mathematical competence (taken as a whole).**

| VARIABLE | PERFORMANCE IN GEOMETRY | | COMPETENCE | |
|---|---|---|---|---|
| | r | r prob | R | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.518** | 0.000 |
| COMPETENCE | 0.518** | 0.000 | 1.0 | 0.000 |

** Highly significant

**Differences in the Performance in Geometry When The Respondents are Classified According to Student Related Factors**

**Performance in Geometry and Gender**

Table 8 shows the performance of the respondents when classified according to gender. Results of the analysis using t-test ($t_{(210)}$= 4.775, p<0.05) revealed a highly significant difference in the performance in geometry of the two groups of respondents. Female respondents (M- 81.914) performed better in geometry than their male counterpart (M = 79.35). The finding clearly suggests that the null hypothesis claiming that there is no significant difference in the performance of students in geometry when they are classified according to gender is rejected.

The result of the study confirmed [3] claiming that gender was related to achievement with the females performing higher than males. Likewise, this result [22] findings that females performed better than males in Algebra, respectively.

**Table 8. T-test results on the differences in performance in geometry when the respondents are classified according to gender**

| COMPARED GROUP | DF | M | SD | t-value | Two-Tailed Probability |
|---|---|---|---|---|---|
| Male | 210 | 79.35 | 3.98 | 4.775** | 0.000 |
| Female | | 81.91 | 3.79 | | |

** Highly significant

**Performance in Geometry and Grade in English**

Result of the analysis of the relationship between performance of the students in geometry and their average third year grade is reflected in Table 9. The r value of 0.797 strongly suggests a highly significant relationship between the two variables, so that the null hypothesis indicating absence of relationship of these two variables mentioned is rejected. The result implies that the higher the grade of the students in English, the higher is their performance in geometry.

**Table 9. Correlation matrix on the relationship between performance in geometry and grade in English**

| VARIABLE | PERFORMANCE IN GEOMETRY | | GRADE IN ENGLISH | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.797** | 0.000 |
| GRADE IN ENGLISH | 0.797 ** | 0.000 | 1.0 | 0.000 |

** Highly significant

**Performance in Geometry and Learning Style**
**Performance in geometry and visual learning style**

To understand better if learning styles affect performance in Geometry, an analysis was done using Pearson Product Moment Correlation and the result is shown in Table 10.

It can be gleaned from the table that there is no significant relationship between performance in geometry and visual learning style of the respondents (r= 0.078, p>0.05). The result implies that students who use visual learning style are not assured to perform well in geometry.

**Performance in Geometry and auditory learning style**

The result of the analysis of the geometry performance of the students and their auditory learning style revealed that there is no significant relationship between the two variables (r= 0.101, p>0.05). This suggests acceptance of the null hypothesis that performance in geometry is not related to the auditory learning style of the students.

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**Table 10. Correlation matrix on the relationship between grade in Geometry and perceived visual learning style.**

| VARIABLE | PERFORMANCE IN GEOMETRY | | VISUAL LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.078ns | 0.259 |
| VISUAL LEARNING STYLE | 0.078ns | 0.259 | 1.0 | 0.000 |

ns - Not significant

**Table 10a. Correlation matrix on the relationship between performance in geometry and perceived auditory learning style**

| VARIABLE | PERFORMANCE IN GEOMETRY | | AUDITORY LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | R | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.101ns | 0.144 |
| AUDITORY LEARNING STYLE | 0.101ns | 0.144 | 1.0 | 0.000 |

ns - Not significant

## Performance in geometry and reading/writing preference learning style

Shown in Table 10b is the result of the analysis of the relationship between performance of the respondents in geometry and their reading/writing preference learning style. The results of the analysis show that there is a significant correlation between the two variables tested ($r= 0.174$, $p< 0.05$). This signals the rejection of the null hypothesis.

The finding implies that the higher the reading/writing preference learning style used by the high school students, the higher is their performance in geometry.

**Table 10 b. Correlation matrix on the relationship between performance in geometry and perceived reading/writing preference learning style**

| VARIABLE | PERFORMANCE IN GEOMETRY | | READING/ WRITING PREFERENCE LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.174* | 0.011 |
| READING/WRITING PREFERNCE LEARNING STYLE | 0.174* | 0.011 | 1.0 | 0.000 |

* Significant at 5% level

## Performance in geometry and tactile learning style

The result of the analysis of the relationship between performance of the respondents in geometry and their tactile/kinesthetic learning style is presented in Table 10c. The result of the analysis shows that there is a significant correlation between the two variables tested. This proves enough evidence to reject the null hypothesis.

The finding seems to indicate that the higher the tactile learning style employed by the high school students, the higher is their performance in Geometry.

**Table 10c. Correlation matrix on the relationship between performance in geometry and perceived tactile learning style**

| VARIABLE | PERFORMANCE IN GEOMETRY | | TACTILE LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.156* | 0.023 |
| TACTILE LEARNING STYLE | 0.156* | 0.023 | 1.0 | 0.000 |

* Significant at 5% level

### Performance in geometry and learning styles (taken as a whole)

The analysis of the relationship between performance of the respondents in geometry and their degree of use of the different learning styles is presented in Table 10d. The results of the analysis suggest a significant correlation between the two variables tested (r= 0.164, p< 0.05). This presents enough evidence to reject the null hypothesis. The finding implies that the higher the value placed by the respondents on the use of a combination of different learning styles, the higher is their performance in geometry.

The result of this study contrasted the findings of [11] that learning styles and academic performance of the first year high school students were not related.

**Table 10d. Correlation matrix on the relationship between performance in geometry and perceived learning style (taken as a whole)**

| VARIABLE | PERFORMANCE IN GEOMETRY | | LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | R | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.164* | 0.017 |
| LEARNING STYLE | 0.164 * | 0.017 | 1.0 | 0.000 |

* Significant at 5% level

### Performance in Geometry and Class Size

Table 11 contains the results of the analysis of the relationship between performance of the students in Geometry and class size using one-way Analysis of Variance. The finding indicates a highly significant difference in the performance of the respondents in geometry when they were classified according to class size (F = 38.805, p<0.05). Therefore the null hypothesis stating absence of relationship between the two variables is rejected. This finding of the study implies that class size significantly affect performance of the students in geometry. This can be explained perhaps by the fact that small class size is more manageable than big class size.

The finding further indicates that students who belonged to small class size had the highest performance in geometry (M= 87.16); followed by average class size ( M= 83.60); and the lowest performance was that of the students who belonged to big class size (79.44). Performance of students in small class is significantly higher than that of average and big class sizes. Likewise, performance in geometry of those who were in the average class size is significantly higher than that of the big class size.

**Table 11. ANOVA on the differences in the performance in geometry when respondents are classified according class size**

| CATE-GORY | SV | Sum of Squares | Df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Class Size | Between Groups | 947.54 | 2 | 473.77 | 38.805** | 0.000 |
| | Within groups | 2551.67 | 209 | 12.209 | | |
| | Total | 3499.21 | 211 | | | |

** Highly significant

### Performance in Geometry and Perceived Classroom Structure

Shown in Table 12 is the analysis of the relationship between performance in Geometry and students perception as to their classroom structure. The result indicates a highly significant correlation between the two variables tested (r= 0.393, p< 0.05), therefore the null hypothesis is rejected due to insufficient evidence to prove that the null hypothesis indicating absence of relationship between performance in Geometry and perceived classroom structure is true.

The result of this study implies that the more highly structured the classroom as perceived by the students, the higher is their performance in Geometry.

This result affirm the contention [26] that the general appearance of the room can stimulate pleasant feelings, attitudes, thoughts, ideas and appreciations that are essential to learning and in effect learning becomes more meaningful.

**Table 12. Correlation matrix on the relationship between performance in geometry and classroom structure.**

| VARIABLE | PERFORMANCE IN GEOMETRY | | CLASSROOM STRUCTURE | |
|---|---|---|---|---|
| | r | r prob | R | r prob. |
| PERFORMANCE IN GEOMETRY | 1.0 | 0.000 | 0.393 * | 0.000 |
| CLASSROOM STRUCTURE | 0.393** | 0.000 | 1.0 | 0.000 |

** Highly significant

**Differences in the Mathematical Competence of the Respondents when Classified According to Student Related Variables and Classroom Management**

**Mathematical Competence and Gender**

**Mathematical concept competence and gender**

Presented in Table 13 is the result of the analysis of the difference in mathematical competence of the respondents when they were classified according to gender. The finding reveals that there is no significant difference in the mathematical concept competence of the two groups of respondents (t(210)= 1.135, p>0.05). This finding shows that there is sufficient evidence to accept the null hypothesis. This implies that regardless of gender, competence in mathematical concept of the high school students is the same.

**Table 13. T-test results on the differences in mathematical concept competence when the respondents are classified according to gender**

| COMPARED GROUP | DF | M | SD | t-value | Two-Tail Probability |
|---|---|---|---|---|---|
| Male | 210 | 36.03 | 12.43 | 1.135[ns] | 0.258 |
| Female | | 37.97 | 12.29 | | |

ns - Not significant

**Competence in mathematical skill and gender**

The result of the analysis of the difference in mathematical skills of the respondents when classified according to gender is shown in Table 13a. The finding reveals that there is no significant difference in the Mathematics skill of the two groups of respondents (t(210)= 1.352, p>0.05).

This finding simply suggests accepting the null hypothesis indicating absence of significant difference in the mathematical competence of the respondents when they are classified according to gender. This implies that regardless of gender, mathematical skills of the high school students is the same.

**Table 13a. T-test results on the difference in competence in mathematics skills when the respondents are classified according to gender**

| COMPARED GROUP | DF | M | SD | t-value | Two-Tailed Probability |
|---|---|---|---|---|---|
| Male | 210 | 32.71 | 11.75 | 1.352[ns] | 0.178 |
| Female | | 36.04 | 13.00 | | |

ns - Not significant

**Mathematical competence (taken as a whole) and gender.**

As shown in Table 13b, the result of the analysis of the difference in mathematical competence of the respondents when they were classified according to gender.

The finding indicates that there is no significant difference in the mathematical competence of the two groups of respondents (t(210)= 1.444, p>0.05). This shows that there is sufficient evidence to accept the null hypothesis and implies that mathematical competence of the high school students is not affected by gender.

**Table 13b. T-test results on the differences in mathematical competence (taken as a whole) when the respondents are classified according to gender**

| COMPARED GROUP | DF | M | SD | t-value | Two-Tail Probability |
|---|---|---|---|---|---|
| Male | 210 | 34.70 | 10.24 | 1.444[ns] | 0.150 |
| Female | | 36.80 | 10.69 | | |

ns - Not significant

**Mathematical Competence and Grade in English**

Presented from Table 14 to Table 14b are the results of the analyses of relationship between mathematical competence of the respondents and their grade in English. The analyses of the two variables reveal that there is a highly significant relationship between the two variables tested. Matching mathematical concept competence (r=0.344, p<0.05) and skills

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in solving problems in geometry (r=0.347, p<0.05) and when taken as a whole (r=0.407, p<0.05) the competence of the students and their grade in English reveal a highly significant relationship. This implies that the higher the grade of the students in English, the higher is their mathematical competence.

**Table 14. Correlation matrix on the relationship between mathematical concept competence and grade in English**

| VARIABLE | MATHEMATICAL COMPETENCE | | GRADE IN ENGLISH | |
|---|---|---|---|---|
| | r | r prob | R | r prob. |
| MATHEMATICAL COMPETENCE | 1.0 | 0.000 | 0.344** | 0.000 |
| GRADE IN ENGLISH | 0.344** | 0.000 | 1.0 | 0.000 |

** Highly significant

**Table 14a. Correlation matrix on the relationship between mathematical skill competence and grade in English**

| VARIABLE | MATHEMATICAL COMPETENCE | | GRADE IN ENGLISH | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| MATHEMATICAL COMPETENCE | 1.0 | 0.000 | 0.347** | 0.000 |
| GRADE IN ENGLISH | 0.347** | 0.000 | 1.0 | 0.000 |

** Highly significant

**Table 14b. Correlation matrix on the relationship between mathematical competence (taken as a whole) and grade in English**

| VARIABLE | MATHEMATICAL COMPETENCE | | GRADE IN ENGLISH | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| MATHEMATICAL COMPETENCE | 1.0 | 0.000 | 0.407** | 0.000 |
| GRADE IN ENGLISH | 0.407** | 0.000 | 1.0 | 0.000 |

** Highly significant

**Mathematical Competence and Learning Style**

Tables 15 to 15b present the results of the analyses of the relationship between mathematical competence of the respondents and their learning style. When the mathematical concept competence in terms of problem solving skill was matched with the respondents' learning style, the results of the analysis using Pearson Product Moment Correlation revealed a significant relationship between the two variables. The result was consistent when the test was done when competence was taken as a whole. This was the basis in rejecting the null hypothesis stating absence of relationship between mathematical competence and learning style of the high school students.

The result implies that the higher that value assigned by the students in the use of the combination of different learning styles, the more competent they would be in geometry concepts and skills.

**Table 15. Correlation matrix on the relationship between mathematical concept competence and learning style**

| VARIABLE | MATHEMATICAL COMPETENCE | | LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| MATHEMATICAL COMPETENCE | 1.0 | 0.000 | 0.150* | 0.029 |
| LEARNING STYLE | 0.150* | 0.029 | 1.0 | 0.000 |

* Significant at 5% level

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**Table 15a. Correlation matrix on the relationship between mathematical skill competence and learning styles**

| VARIABLE | MATHEMATICAL COMPETENCE | | LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| MATHEMATICAL COMPETENCE | 1.0 | 0.000 | 0.143* | 0.037 |
| LEARNING STYLE | 0.143* | 0.037 | 1.0 | 0.000 |

* Significant at 5% level

**Table 15b. Correlation matrix on the relationship between mathematical competence (taken as a whole) and learning style**

| VARIABLE | MATHEMATICAL COMPETENCE | | LEARNING STYLE | |
|---|---|---|---|---|
| | r | r prob | r | r prob. |
| MATHEMATICAL COMPETENCE | 1.0 | 0.000 | 0.174* | 0.011 |
| LEARNING STYLE | 0.174* | 0.011 | 1.0 | 0.000 |

* Significant at 5% level

**Mathematical Competence and Class Size**

The differences in the mathematical competence of the student-respondents when they were classified according to class size are shown in Table 16 to Table 16b. When the relationship between mathematics concept competence and class size was compared using F-test (F= 13.283, p<0.05), the result indicates a significant difference in the mathematical competence of the respondents. It was further revealed that there was a significant difference in the problem solving skills of the respondents (F= 6.334, p<0.05) when classified according to class. The result was consistent when taken as a whole (F= 14.606, p<0.05). This was the basis for rejecting the null hypothesis which states that there is no significant difference in the mathematical competence of the students when classified according to class size. It was found in the study that the mathematical competence of the students who were in the small class size is significantly higher than those in the average and big class sizes.

**Table 16. ANOVA on the differences in mathematical concept competence when respondents are classified according to class size**

| CATEGORY | SV | Sum of Squares | Df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Class Size | Between Groups | 3634.23 | 2 | 1817.12 | 13.283 ** | 0.000 |
| | Within groups | 28591.33 | 209 | 136.80 | | |
| | Total | 32225.57 | 211 | | | |

** Highly significant

**Table 16a. ANOVA on the differences in mathematical skills when the respondents are classified according to class size**

| CATEGORY | SV | Sum of Squares | Df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Class Size | Between Groups | 1879.67 | 2 | 939.83 | 6.334 ** | 0.002 |
| | Within groups | 31012.32 | 209 | 148.38 | | |
| | Total | 32891.98 | 211 | | | |

** Highly significant

**Table 16b. ANOVA on the differences in mathematical competence (taken as a whole) when the respondents are classified according class size.**

| CATEGORY | SV | Sum of Squares | Df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Class Size | Between Groups | 2863.20 | 2 | 1431.60 | 14.606** | 0.000 |
| | Within groups | 20485.10 | 209 | 98.015 | | |
| | Total | 23348.30 | 211 | | | |

** Highly significant

## Mathematical Competence and Perceived Classroom Structure

Shown in Table 17 to 17b are the results of the analysis of the mathematical competence of the respondents when classified according to class structure. In all the tests done to determine if there is a significant difference in the mathematical concept skill and problem solving skill of the respondents classified according to their perceived classroom structure, it was found that there is no significant difference. The results simply suggest that regardless of the perceived classroom structure, mathematical competence of the students are the same in all categories. This implies that mathematical competence of the students in geometry is not affected by their perception as to their classroom structure.

**Table 17. ANOVA on the differences in mathematical concept competence when the respondents are classified according class structure.**

| CATEGORY | SV | Sum of Squares | Df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Class Structure | Between Groups | 623.43 | 2 | 311.71 | 2.062 ns | 0.130 |
| | Within groups | 31602.14 | 209 | 151.206 | | |
| | Total | 32225.57 | 211 | | | |

ns - Not significant

**Table 17a. ANOVA on the differences in mathematical skill competence when the respondents are classified according to class structure.**

| CATEGORY | SV | Sum of Squares | Df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Class Structure | Between Groups | 21.51 | 2 | 10.75 | 0.068 ns | 0.934 |
| | Within groups | 32870.48 | 209 | 157.28 | | |
| | Total | 32225.57 | 211 | | | |

ns - Not significant

**Table 17b. ANOVA on the differences in mathematical competence when the respondents are classified according to class structure.**

| CATEGORY | SV | Sum of Squares | Df | Mean square | F | Sig |
|---|---|---|---|---|---|---|
| Class Structure | Between Groups | 280.69 | 2 | 140.34 | 1.272 ns | 0.283 |
| | Within groups | 23067.62 | 209 | 110.37 | | |
| | Total | 23348.30 | 211 | | | |

ns - Not significant

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## REFERENCES

[1]. BACALANGCO, C. 2011. Students Learning Styles and Academic Achievement in Math. Unpublished Master's Thesis, University of the Philippines.

[2]. DE WALLE, V. 2001. Curriculum and Instruction: The Teaching of Mathematics. Mathematics Teacher Ed Council, DepEd, TIP Module 6.3.

[3]. ALTABANO, M. B. 2002. Mastery of Mathematics Concepts by the High School Freshmen of PSPC Mambusao. Unpublished Master's Thesis, PSPC, Mambusao, Capiz.

[4]. UMANI, E. G. 2003. Level of Mastery of the Mathematics Computation and Solving Problem Skills of the Grade V Pupils. Unpublished Master's Thesis, University of Iloilo.

[5]. KRUNICK, S. & RUDNICK, J. 1996. "Teaching and Problem Solving in Junior and Senior High Schools". Retrieved September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[6]. M. VERO DE VAULT, "Doing Mathematics in Problem Solving". (The Arithmetic Teacher, II, No. 3 1987)

[7]. STANIC, G. and KILPATRICK, J. 1989. "Historical perspective on problem solving in the mathematics curriculum". Retrieved on September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[8]. DE LEON, et al. 2002. Geometry Textbooks for Third Year. JTW Corporation, Quezon City.

[9]. SOVA, D. B. 2000. How to solve Word Problems in Geometry. International Edition, Mc Graw Hill Companies Inc., Philippines

[10]. OBSIANA, X. 2007. Computational Skills and Problem Solving Performance of Students in Trigonometry. Unpublished Master's Thesis, Filamer Christian College, Roxas City, 2007.

[11]. National Council of Teachers of Mathematics (NCTM) (1980). "An Agenda for Action: Recommendations for School Mathematics of the 1980s". Reston, Virginia: Retrieved September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[12]. National Council of Teachers of Mathematics (NCTM) (1989). "Curriculum and Evaluation Standards for School Mathematics". Reston, Virginia: NCTM. Retrieved September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[13]. COCKROFT, W. H. (Ed.) 1982. Mathematics Counts. Report of the Committee of Inquiry into the Teaching Mathematics in schools, London: Retrieved September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[14]. POLYA, G. 1980. "Problem Solving in School Mathematics". Retrieved on September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[15]. OLKIN, I. and SHOENFELD, A. 1994. "Mathematical thinking and Problem Solving". Retrieved September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[16]. CARPENTER, T. P. 1989. "Teaching as Problem Solving". Retrieved September 16, 2011 from www.mathgoodies.com/articles/problemsolving.html

[17]. THOMPSON, P. W. 1985. "Experience, problem solving, and learning mathematics: considerations in developing mathematics curricula". Retrieved on September 16, 2011 from www.mathgoodies.com/articles/problemsolving. html.

[18]. DALIDA, J. V. 2002. Problem Solving Approaches and Mathematical Ability of College Freshmen in PSPC Mambusao. Unpublished Master's Thesis, PSPC, Mambusao, Capiz.

[19]. ABOLUCION, P. M. 2004. Learning Styles and Mathematics Achievement in the Context of Personalized Education Program. Unpublished Master's Thesis, West Visayas State University, Iloilo City.

[20]. COSTOY, J. M. 2002. Students Attitudes towards Mathematics in relation to their Performance in Arithmetic Computation and Problem Solving Skills. Unpublished Master's Thesis, University of Iloilo.

[21]. GERVERO, R. 1998. Attitudes and Performance of Grade V Pupils in Mathematics. Unpublished Master's Thesis, University of Iloilo.

[22]. DALIVA, R. C. 2010. The Effects of Small Groups – within- A Large- Group Instruction on the Performance in Geometry of High School Students. Unpublished Master's

[23]. Thesis, Filamer Christian College, Roxas City.

[24]. JUDIT, L. E. 2002. Performance in Algebra Among Freshmen at PSPC, Sigma Campus. Unpublished Master's Thesis, Panay State Polytechnic College, Mambusao, Capiz.

[25]. SULIT, A. S. 2005. Learning and Teaching Styles: Their Influence to Mathematical Achievement. Unpublished Master's Thesis, West Visayas State University, Iloilo City.

[26]. LAGON, M. D. 2011. Learning Styles: Their Influence on the Academic Performance of Grade VI Pupils. Unpublished Master's Thesis, Capiz State University, Mambusao, Capiz.

[27]. PANGANTIHON, M. O. 2003. The Influence of Learning Style and Perceived Teacher Competence on Math Performance. Unpublished Master's Thesis, West Visayas State University, Iloilo City.

[28]. ZULUETA, F. M. 2006. Principles and Methods of Teaching. Manila, National Bookstore, Mandaluyong City

[29]. GREGORIO, H.C. 1976. Principles and Methods of Teaching, Quezon City: R.P. Garcia Publishing Company